

<110> Organization Name : Carlsberg A/S

Application Project

<120> Title : Barley for production of flavor-stable beer

<130> AppFileReference : 1

<140> CurrentAppNumber :

<141> CurrentFilingDate : ____-__-__

Sequence

<213> OrganismName : Hordeum vulgare cv. Barke

<400> PreSequenceString :

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<212> Type : DNA

<211> Length : 4165

SequenceName : SEQ ID NO: 1

SequenceDescription : Barley genomic sequence of cv. Barke,
spanning
the start and stop codons of the gene encoding LOX-1

Sequence

<213> OrganismName : Hordeum vulgare mutant D112

<400> PreSequenceString :

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<212> Type : DNA

<211> Length : 4165

SequenceName : SEQ ID NO: 2

SequenceDescription : Barley genomic sequence of mutant D112 spanning the segment, corresponding to the region between the start and stop codons of the gene encoding LOX-1 of cv. Barke

Sequence

<213> OrganismName : Hordeum vulgare cv. Barke

<400> PreSequenceString :

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EFLKLTITLH DVPGRSGNLT FVANSWIYPA ANYRYSRVFF ANDTYLPSQM PAALKPYRDD 180
ELRNLRGDDQ QGPYQEHDRY YRYDVYNDLG EGRPILGNS DHPYPRRGRT ERKPNASDPS 240
LESRLSLLEQ IYVPRDEKFG HLKTSDFLGY SIKAITQGIL PAVRTYVDTT PGEFDSFQDI 300
INLYEGGIKL PKVAALEELR KQFPLQLIKD LLPVGGDSL KLPVPHIIQE NKQAWRTDEE 360
FAREVLAVGN PVMITRLTEF PPKSSLDPSK FGDHTSTITA EHIEKNLEGL TVQQALESNR 420
LYILDHHDHF MPFLIDVNNL PGNFYATRT LFFLRGDGRL TPLAIELSEP IIQGGLTAK 480
SKVYTPVPSG SVEGWVWELA KAYVAVNDG WHQLVSHWLN THAVMEPFVI STNRHLSVTH 540
PVHKLLSPHY RDTMTINALA RQTLINAGGI FEMTVFPGKF ALGMSAVVYK DWKFTEQGLP 600
DDLIKRGMAV EDPSSPYKVR LLVSDYPYAA DGLAIWHAIE QYVSEYLAIY YPNDGVLQGD 660
TEVQAWWKET REVGHGDLKD APWWPKMQSV PELAKACTTI IWIGSALHAA VNFGQYPYAG 720
FLPNRPTVSR RRMPEPGTEE YAELEDPER AFIHTITSQI QTIIGVSLLE VLSKHSSDEL 780
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TSDHKGAAAG LTAKGIPNSI SI 862

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<212> Type : PRT

<211> Length : 862

SequenceName : SEQ ID NO: 3

SequenceDescription : Protein sequence of full-length LOX-1 protein of cv. Barke

Sequence

<213> OrganismName : Hordeum vulgare mutant D112

<400> PreSequenceString :

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EFL LKTITLH DVPGRSGNLT FVANSWIYPA ANYRYSRVFF ANDTYLPSQM PAALKPYRDD      180
ELRNLRGDDQ QGPYQEH DRI YRYDVYNDLG EGRPILGGNS DHPYPRRGRT ERKPNASDPS      240
LESRLSLLEQ IYVPRDEKFG HLKTSDFLG Y SIKAITQGIL PAVRTYVDTT PGEFDSFQDI      300
INLYEGGIKL PKVAALEELR KQFPLQLIKD LLPVGGDSLL KLPVPHIIQE NKQAWRTDEE      360
FAREVLAVGN PVMITRLTEF PPKSSLDPSK FGDHTSTITA EHIEKNLEGL TVQQALESNR      420
LYILDHHD RF MPFLIDVNNL PGNFYIATRT LFFLRGDGRL TPLAIELSEP IIQGGLTTAK      480
SKVYTPVPSG SVEGWVWELA KAYVAVND SG WHQLVSHWLN THAVMEPFVI STNRHLSVTH      540
PVHKLLSPHY RDTMTINALA RQTLINAGGI FEMTVFPGKF ALGMSAVVYK DWKFTEQGLP      600
DDLIKRGMAV EDPSSPYKVR LLVSDYPYAA DGLAIWHAIE QYVSEYLA IY YPNDGVLQGD      660
TEVQA                                             665

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<212> Type : PRT

<211> Length : 665

SequenceName : SEQ ID NO: 4

SequenceDescription : Protein sequence of inactive,
truncated LOX-1 of mutant D112

Sequence

<213> OrganismName : Hordeum vulgare cv. Neruda

<400> PreSequenceString :

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atcgacggca tcggcgagtt cctcggcaag ggcgtcacct gccagcttat cagctccacc      180
gccgtcgacc aaggtaatca ctaccctcct ccggccttct cctctgttta caagatatag      240
tatttctttc gtgtgggccg gcggccatgg atggatggat gtgtctggat cggtctaaaga      300
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tcgagacaaa gcaacacaac aagcaaggac gacacgtcaa aagcaacaca acaagcaagg      480
acggcacgtc aaaagcaaca caaacctaaa ctaaagcaca aagacgtaag agcaagcaca      540
caatcagcag gctataaaca gttgtcatca aaaacaacgc tggaagagag agagaaggaa      600
ggaagtagta gccatgaaaa attaaatcac cgggcgttgc tctttgcccc acaattaatc      660
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```

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catcccaaac agcatctcca tctaa 4165

```

<212> Type : DNA

<211> Length : 4165

SequenceName : SEQ ID NO: 5

SequenceDescription : Barley genomic sequence of cv. Neruda
spanning the start and stop codons of the gene encoding LOX-1

Sequence

<213> OrganismName : Hordeum vulgare mutant A618

<400> PreSequenceString :

```

atgctgctgg gagggctgat cgacaccctc acgggggcga acaagagcgc ccggtcaag 60
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atcgacggca tcggcgagtt cctcggaag ggcgtcacct gccagcttat cagctccacc 180
gccgtcgacc aaggtaatca ctaccctcct ccggccttct cctctgttta caagatatag 240
tattttcttc gtgtgggccc gcggccatgg atggatggat gtgtctggat cggctaaaga 300
agataggata gctagccctg gccggtcgtc ttacctgag catgggcata tgccatcgaa 360
aaaagagaca acagcatgca tgcatggtgc gcgcaccaga ccacgcagag caccggatgc 420
tcgagacaaa gcaacacaac aagcaaggac gacacgtcaa aagcaacaca acaagcaagg 480
acggcacgtc aaaagcaaca caaacctaaa ctaaagcaca aagacgtaag agcaagcaca 540
caatcagcag gctataaaca gttgtcatca aaaacaacgc tggaagagag agagaaggaa 600

```

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agtgggtgac	gagcctgccg	tcgctgacga	cgggggagtc	caagttcggc	ctcaccttcg	840
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```

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gggcatgaac catgaccgag agctcaagaa ccgcaacggc ccggctaagt ttccctacat 4080
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catccccaac agcatctcca tctaa 4165

```

<212> Type : DNA

<211> Length : 4165

SequenceName : SEQ ID NO: 6

SequenceDescription : Barley genomic sequence of mutant A618,
spanning the segment corresponding to the region between
the start and stop codons of the gene encoding LOX-1 of cv. Neruda

Sequence

<213> OrganismName : Hordeum vulgare cv. Neruda

<400> PreSequenceString :

```

MLLGGLIDTL TGANKSARLK GTVVMRKNV LDLNDFGATI IDGIGEF LGK GVTCQLISST 60
AVDQDNNGRG KVGAEAELEQ WVTSLPSLTT GESKFGLTFD WEVEKLG VPG AIVVN NYHSS 120
EFLKLTITLH DVPGRSGNLT FVANSWIYPA ANYRYSRVFF ANDTYLPSQM PAALKPYRDD 180
ELRNLRGDDQ QGPYQEH DRI YRYDVYNDLG EGRPILG GNS DHPYPRRGRT ERKP NASDPS 240
LESRLSLLEQ IYVPRDEKFG HLKTSDF LGY SIKAITQ GIL PAVRTYVD TT PGEFDSFQDI 300
INLYEGGIKL PKVAALEELR KQFPLQLIKD LLPVG GDSL KLPVPHIIQE NKQAWRTDEE 360
FAREVLAGVN PVMITRLTEF PPKSSLDPSK FGDHTSTITA EHIEKNLEGL TVQQALESNR 420

```

```

LYILDHHDRF MPFLIDVNNL PGNFIYATRT LFFLRGDGRL TPLAIELSEP IIQGGLTTAK      480
SKVYTPVPSG SVEGWVWELA KAYVAVND SG WHQLVSHWLN THAVMEPFVI STNRHLSVTH      540
PVHKLLSPHY RDTMTINALA RQTLINAGGI FEMTVFPGKF ALGMSAVVYK DWKFTEQGLP      600
DDLIKRGMAY EDPSSPYKVR LLVSDYPYAA DGLAIWHAIE QYVSEYLAIY YPNDGVLQGD      660
TEVQAWWKET REVGHGDLKD APWWPKMQSV PELAKACTTI IWIGSALHAA VNFGQYPYAG      720
FLPNRPTVSR RRMPEPGTEE YAELE RDPER AFIHTITSQI QTIIGVSLLE VLSKHSSDEL      780
YLGQRDTP EW TSDPKALEVF KRFS DRLVEI ESKVVG MNHD PELKNRNGPA KFPYMLLYPN      840
TSDHKGAAAG LTAKGIPNSI SI                                              862

```

<212> Type : PRT

<211> Length : 862

SequenceName : SEQ ID NO: 7

SequenceDescription : Protein sequence of full-length

LOX-1 protein of cv. Neruda

Sequence

<213> OrganismName : Hordeum vulgare mutant A618

<400> PreSequenceString :

```

MLLGGLIDTL TGANKSARLK GTVVLMRKNV LDLNDFGATI IDGIGEF LGK GVTCQLISST      60
AVDQDNGGRG KVGAEAELEQ WVTSLPSLTT GESKFGLTFD WEVEKLG VPG AIVVN NYHSS      120
EFLKKTITLH DVPGRSGNLT FVANSWIYPA ANYRYSRVFF ANDTYLPSQM PAALKPYRDD      180
ELRNLRGDDQ QGPYQEH DRI YRYDVYNDLG EGRPILGGNS DHPYPRRGRT ERKPNASDPS      240
LESRLSLEEQ IYVPRDEKFG HLKTSDF LGY SIKAITQGIL PAVRTYVDTT PGEFDSFQDI      300
INLYEGGIKL PKVAALEELR KQFPLQLIKD LLPVG GDSLL KLPVP HIIQE NKQAWRTDEE      360
FAREVLAGVN PVMITRLTMS QRLFVHCVC M VSMVRKCRS                          399

```

<212> Type : PRT

<211> Length : 399

SequenceName : SEQ ID NO: 8

SequenceDescription : Protein sequence of inactive,
truncated LOX-1 of mutant A618

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

```

gaaagcgagg agaggaggcc aagaacaa                                         28

```

<212> Type : DNA

<211> Length : 28

SequenceName : SEQ ID NO: 9

SequenceDescription : Oligonucleotide primer used for PCR
amplification (sense primer)

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

ttattcatcc atggttgccg atggcttaga

30

<212> Type : DNA

<211> Length : 30

SequenceName : SEQ ID NO: 10

SequenceDescription : Oligonucleotide primer used for PCR
amplification (antisense primer)

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

agggactgcc ggacgatctc a

21

<212> Type : DNA

<211> Length : 21

SequenceName : SEQ ID NO: 11

SequenceDescription : Oligonucleotide primer used for PCR
amplification (sense primer)

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

gccagctccg gcacactt

18

<212> Type : DNA

<211> Length : 18

SequenceName : SEQ ID NO: 12

SequenceDescription : Oligonucleotide primer used for PCR
amplification (antisense primer)

Sequence

<213> OrganismName : Oligonucleotide

```

<400> PreSequenceString :
caaggtgctgcgg ttgctggtgt c
21
<212> Type : DNA
<211> Length : 21
    SequenceName : SEQ ID NO: 13
    SequenceDescription : Oligonucleotide primer used for PCR
    amplification (sense primer)

Sequence
-----
<213> OrganismName : Oligonucleotide
<400> PreSequenceString :
ctcgcgcgctc tccttccac
19
<212> Type : DNA
<211> Length : 19
    SequenceName : SEQ ID NO: 14
    SequenceDescription : Oligonucleotide primer used for PCR
    amplification (antisense primer) Sequence
-----
<213> OrganismName : Oligonucleotide
<400> PreSequenceString :
ctcgcgcgctc tccttccat
19
<212> Type : DNA
<211> Length : 19
    SequenceName : SEQ ID NO: 15
    SequenceDescription : Oligonucleotide primer used for PCR
    amplification (antisense primer)

Sequence
-----
<213> OrganismName : Oligonucleotide
<400> PreSequenceString :
tacgtgccgc gggacgagaa g
21
<212> Type : DNA
<211> Length : 21
    SequenceName : SEQ ID NO: 16
    SequenceDescription : Oligonucleotide primer used for PCR
    amplification (sense primer)

```

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

tgatcatgac cgggttgacg t

21

<212> Type : DNA

<211> Length : 21

SequenceName : SEQ ID NO: 17

SequenceDescription : Oligonucleotide primer used for PCR
amplification (antisense primer)

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

catatgctgc tgggagggt g

21

<212> Type : DNA

<211> Length : 21

SequenceName : SEQ ID NO: 18

SequenceDescription : Oligonucleotide primer used for PCR
amplification (sense primer)

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

gaattcttag atggagatgc tgttggg

27

<212> Type : DNA

<211> Length : 27

SequenceName : SEQ ID NO: 19

SequenceDescription : Oligonucleotide primer used for PCR
amplification (antisense primer)

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

ctacccgtac gcggcggacg ggct

24

<212> Type : DNA

<211> Length : 24

SequenceName : SEQ ID NO: 20

SequenceDescription : Oligonucleotide primer used for PCR
amplification (sense primer)

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

tcctgaattc acgcctgcac ctccgtatcg c

31

<212> Type : DNA

<211> Length : 31

SequenceName : SEQ ID NO: 21

SequenceDescription : Oligonucleotide primer used for PCR
amplification (antisense primer)